

### **REMARKS**

Claims 1-18, 20-24 and 26-30 are currently pending in the subject application and are presently under consideration. Claims 1, 12, 20 and 21 have been amended and claims 4 and 22 have been cancelled herein as shown on pages 2-5 of the Reply. The below comments present in greater detail distinctive features of applicants' claimed invention over the cited art that were conveyed to the Examiner over the telephone on December 19, 2007.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

#### **I. Rejection of Claims 1-11 and 26-30 Under 35 U.S.C. §101**

Claims 1-11 and 26-30 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is respectfully requested for at least the following reasons. Claim 1 has been amended to recite a computer implemented system for managing the access of system resources in a database comprising the following computer executable components, utilized in management of locks on database resources. Claim 26 recites a computer executable lock manager. The claims pertain to a computer executable lock manager that stores a reference count of child locks within a parent locks so that the parent lock is released upon releasing all the child locks. Such a system produces a concrete, tangible result of a reference count of child locks stored within parent locks, which is useful for determining the lifetime of the parent locks. Accordingly, it is submitted that the computer implemented system and method recited in the subject claims produces a useful, concrete and tangible result and is therefore statutory.

#### **II. Rejection of Claims 1, 5-9, 11-14, 16 and 17 Under 35 U.S.C. §103(a)**

Claims 1, 5-9, 11-14, 16 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ashok M. Joshi (US 5,414,839) in view of Bray, *et al.* (US 6,529,905). Withdrawal of this rejection is requested for at least the following reasons. Joshi or Bray *et al.* alone or in combination fail to teach or suggest each and every feature of the subject invention.

Applicants' claimed invention relates to systems and methods for supplying a database with a parent-child lock hierarchy arrangement, such that each lock contains sufficient information to determine its own lifetime. In particular, amended independent claim 1 recites *a*

computer implemented database management system comprising a lock manager that acquires a parent lock and one or more child locks on resource(s) of a database, the lock manager stores a reference count of the one or more child locks within the parent lock such that, **as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith.** Independent claim 12 recites similar features. Joshi and Bray *et al.* do not disclose or suggest such novel features recited by the subject claims.

Joshi relates to a database system that uses lock escalation and de-escalation protocols in a concurrency control mechanism. A lock granularity tree with a root node and leaf nodes of lower granularity, organizes records of a table into a hierarchy. At the cited portions, Joshi discloses a locking system that on a request for accessing a record, acquires a strong lock on the highest possible ancestor of the record in the tree. By locking the highest node, all descendants of the node are implicitly locked. When the lock on the parent node is unlocked, the locks on all the descendent nodes are also implicitly unlocked. Further, Joshi discloses storing lock data structures for a particular transaction. Information about parent and children such as pointer to the parent of the node, number of children of the node, pointers to the children and account of the children of the node implicitly locked are stored in the graph. This data is utilized to determine whether a record to be accessed is already locked and to free updated records. In contrast, the claimed invention allows a child lock to be released without releasing the parent lock, decreasing a reference counter in the parent by one, and releasing the parent lock only after all the child locks are released. However, Joshi does not teach *releasing a child lock* and is silent regarding **as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith** as recited by the subject claims.

Bray *et al.* relates to systems and a method for locking elements in a hierarchical data structure to allow multiple users at various distributed clients to simultaneously edit unlocked portions of the data structure. At the cited portions, Bray *et al.* discloses locking sequences and actions caused by deleting a node in the data structure. The target node is placed under lock and the entire subtree under the node is locked. In addition, the parent of the target node is locked. Both locks are released once the deletion process is complete. However, Bray *et al.* is silent regarding *the lock manager stores a reference count of the one or more child locks within the*

*parent lock such that, as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith.*

By providing a reference count of the number of child locks under a parent lock, the system provides a lock with information to determine its own lifetime, and facilitate lock management, as any lock can be released upon its associated child locks being released, and its reference count reaching a value of zero. Such an arrangement enhances concurrency of transactions by mitigating unnecessary blocking of the data in a database.

In view of the above, it is readily apparent that Joshi and Bray *et al.* alone or in combination, do not teach or suggest all limitations as recited in independent claims 1 and 12 (and the claims that depend from). Accordingly, it is respectfully requested that this rejection should be withdrawn.

### **III. Rejection of Claims 2-4, 10, 15 and 18 Under 35 U.S.C. §103(a)**

Claims 2-4, 10, 15 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Joshi in view of Bray and further in view of Chan, *et al.* (US 6,108,654). Withdrawal of this rejection is requested for at least the following reasons. Claim 4 stands cancelled herein. Claims 2, 3, 10, 15 and 18 depend from independent claims 1 and 12. As discussed *supra*, Joshi and Bray *et al.* alone or in combination fail to teach or suggest each and every feature of independent claims 1 and 12. Chan *et al.* relates to finer-grained dynamic allocation and de-allocation of locks in a system, while protecting against abnormal termination that may result in data integrity problems, but fails to cure the aforementioned deficiencies of *as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith.* Accordingly, it is requested that this rejection with respect to claims 2, 3, 10, 15 and 18 be withdrawn.

### **IV. Rejection of Claims 20-24 and 26-30 Under 35 U.S.C. §103(a)**

Claims 20-24 and 26-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Joshi in view of Bray and further in view of Chan, *et al.* (US 6,108,654). Withdrawal of this rejection is requested for at least the following reasons. Joshi, Bray *et al.* and Chan *et al.* alone or in combination fail to teach or suggest each and every feature of the subject invention.

Applicants' claimed invention relates to systems and methods for supplying a database with a parent-child lock hierarchy arrangement, such that each lock contains sufficient information to determine its own lifetime. In particular, amended independent claim recites *locking means for locking a resource on a database, means for counting one or more child locks associated with the locking means, wherein the counting means is decreased by one as each child lock is released; and means for determining a lifetime of the locking means based on the number of child locks associated therewith.* Independent claims 21 and 26 recite similar features.

As discussed *supra*, with respect to independent claim 1, Joshi and Bray *et al.*, alone or in combination fail to disclose the feature of releasing child locks, decreasing the reference counter in the parent by one and determining release of the parent lock based on the child locks.

Chan *et al.* relates to finer-grained dynamic allocation and de-allocation of locks in a system, while protecting against abnormal termination that may result in data integrity problems. At page 11 of the Office Action, the Examiner contends that Chan *et al.* teaches such novel features of applicants' claimed invention. Applicants' representative avers to the contrary. At the cited portions, Chan *et al.* discloses a distributed data processing system comprising multiple nodes, each node comprising a data store and a data processing system with objects or resources shared with any of the other nodes. Each node has its own instantiation of a distributed lock manager instance that manages the locks granted to the resource of that node. If a process seeks to access a resource, it sends a lock request to the lock manager. The lock manager grants a lock to a process until the process indicates that the lock is no longer needed, at which time the manager releases the lock. Thus, the nodes disclosed by Chan *et al.* are nodes in a distributed data processing system, each node having a lock manager that manages locks in that node, but nowhere does Chan *et al.* disclose a parent/child or root/leaf relationship between the nodes. Thus, Chan *et al.* is silent regarding *means for counting one or more child locks associated with the locking means, wherein the counting means is decreased by one as each child lock is released; and means for determining a lifetime of the locking means based on the number of child locks associated therewith* as recited by the subject claims.

In view of the above, it is readily apparent that Joshi, Bray *et al.* and Chan *et al.*, alone or in combination, do not teach or suggest all limitations as recited in independent claims 20, 21 and

26 (and the claims that depend from). Accordingly, it is respectfully requested that this rejection should be withdrawn.

**CONCLUSION**

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP622US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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